

## Chirag Gupta, Ph.D.

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### SUMMARY

Bioinformatics Scientist with 4+ years of postdoctoral experience in research and analysis of genomics data. I am interested in developing computational approaches to glean actionable insights from large-scale multi-omics data. I am currently working on building machine learning models to guide biomarker discovery and assist in clinical decision making. I have extensive experience in written and oral communication to academics and business leaders through contributions to winning grants, 12+ peer reviewed publications, and several conference appearances.

### EDUCATION

2017	<b>Ph.D. Computational Biology</b> (Cell and Molecular Biology) Dissertation: Transcriptome-based gene networks for systems-level analysis of gene function	<b>University of Arkansas,</b> Fayetteville, Arkansas, USA
2009	<b>M.S. Bioinformatics</b>	<b>Sardar Patel University,</b> India
2007	<b>B.S. Bioinformatics</b>	<b>Sardar Patel University,</b> India

### RESEARCH EXPERIENCE

2021 – present	<b>Postdoctoral Research Associate</b> <ul style="list-style-type: none"><li>• Single cell genomics of the human brain</li><li>• Cell type network biology</li><li>• Network-based drug discovery</li></ul>	<b>University of Wisconsin,</b> Madison, Wisconsin, USA
2017 – 2020	<b>Postdoctoral Research Associate</b> <ul style="list-style-type: none"><li>• Plant and crop genomics</li><li>• Gene prioritization protocols</li><li>• Web-applications for biologists</li></ul>	<b>University of Arkansas,</b> Fayetteville, Arkansas, USA
2012 – 2017	<b>Graduate Research Assistant</b> <ul style="list-style-type: none"><li>• Plant stress and developmental biology</li><li>• Large-scale transcriptomics</li><li>• Gene regulatory networks</li></ul>	<b>University of Arkansas,</b> Fayetteville, Arkansas, USA
2008 — 2009	<b>Student Researcher</b> <ul style="list-style-type: none"><li>• Fusion proteins in cancer</li><li>• Protein structure prediction</li><li>• Molecular modeling, drug designing</li></ul>	<b>Disha Life Sciences Pvt. Ltd.,</b> Gujarat, India

## PUBLICATIONS

### *Under review/preprints*

1. **Chirag Gupta**, Jielin Xu, Ting Jin, Saniya Khullar, Xiaoyu Liu, Sayali Alatkhar, Feixiong Cheng, Daifeng Wang. Single-cell network biology characterizes cell type gene regulation for drug repurposing and phenotype prediction in Alzheimer's disease. ([preprint](#))
2. **Chirag Gupta**, Arjun Krishnan, Andrew Schneider, Cynthia Denbow, Eva Collakova, Pawel Wolinski, Andy Pereira. SANE: The Seed Active Network for Discovering Transcriptional Regulatory Programs of Seed Development. ([preprint](#))

### *Peer reviewed journal articles*

1. **Chirag Gupta**, Pramod Chandrashekar, Chenfeng He, Ting Jin, Saniya Khullar, Qiang Chang, Daifeng Wang. Bringing machine learning to research on intellectual and developmental disabilities: taking inspiration from neurological diseases. in press, **Journal of Neurodevelopmental Disorders** (IDDRC 2022 special issue on computational neuroscience)
2. Anuj Kumar, **Chirag Gupta**, Julie Thomas, Andy Pereira. Genetic Dissection of Grain Yield Component Traits Under High Nighttime Temperature Stress in a Rice Diversity Panel. **Frontiers in Plant Science**, September 2021. ([full text](#))
3. **Chirag Gupta**, Venkategowda Ramegowda, Supratim Basu, Andy Pereira. Using network-based machine learning to predict transcription factors involved in drought stress resistance. **Frontiers in Genetics**, June 2021. ([full text](#))
4. Raksha Singh, Rohana Liyanage, **Chirag Gupta**, Jackson Lay Jr., Andy Pereira, Clemencia Rojas. The protein interactomes of AtNHR2A and AtNHR2B unraveled common and specialized functions in plant immunity integrating distinct biological processes. **Frontiers in Plant Science**, March 2020. ([full text](#))
5. Min Woo Lee, Carmen S. Padilla, **Chirag Gupta**, Aravind Galla, Andy Pereira, Jiamei Li, Fiona L. Goggins. The FATTY ACID DESATURASE 2 family in tomato contributes to primary metabolism and stress responses. **Plant Physiology**, Nov. 2019. ([full text](#))
6. **Chirag Gupta** and Andy Pereira. Recent advances in gene function prediction using context-specific coexpression networks in plants. **F1000Research**, Feb. 2019. ([full text](#))
7. Arjun Krishnan, **Chirag Gupta**, Madana MR Ambavaram, Andy Pereira. RECoN: Rice Environment Co-expression Network for systems level analysis of abiotic-stress response. **Frontiers in Plant Science**, Sep. 2017. ([full text](#))
8. Venkategowda Ramegowda, Upinder Singh Gill, Palaiyur Nanjappan Sivalingam, Aarti Gupta, **Chirag Gupta**, Geetha Govind, Karaba N Nataraja, Andy Pereira, Makarla Udayakumar, Kirankumar S Mysore, Muthappa Senthil-Kumar. GBF3 transcription factor imparts drought tolerance in Arabidopsis thaliana. **Scientific Reports**, August 2017. ([full text](#))

9. Venkategowda Ramegowda, Supratim Basu, **Chirag Gupta**, Andy Pereira. Regulation of grain yield in rice under well-watered and drought stress conditions by GUDK. ***Plant Signaling and Behavior***, January 2015. [[full text](#)]

#### *Published project reports*

1. Anuj Kumar, Sara Yingling, Yheni Dwiningsih, Charles Ruiz, Julie Thomas, **Chirag Gupta**, Paul Counce, T.J. Siebenmorgen, Karen AK Moldenhauer, Andy Pereira. Genome-Wide Association Study for Identification of Novel Genomic Loci Associated with Grain Yield and Quality Traits in Japonica Rice under High Nighttime Temperature. ***B.R. Wells Arkansas Rice Research Studies*** 2020, 667:45-48.
2. Anuj Kumar, Sara Yingling, Julie Thomas, Charles Ruiz, Yheni Dwiningsih, **Chirag Gupta**, Paul Counce, T.J. Siebenmorgen, Karen A.K. Moldenhauer, Andy Pereira. Screening of Indica and Japonica rice subspecies for grain yield and quality under high nighttime temperature. ***B.R. Wells Arkansas Rice Research Studies*** 2018, 659:61-66.
3. Ramegowda Venkategowda, Subodh Srivastava, Julie Thomas, **Chirag Gupta**, Supratim Basu, Paul Counce, Ya-Jane Wang, Terry Siebenmorgen, Karen Moldenhauer, Andy Pereira. Genetic basis of altered grain quality in different rice cultivars under high nighttime temperature. ***B.R. Wells Arkansas Rice Research Studies*** 2015, 634:79-85.

## CONFERENCE PRESENTATIONS

### *Talks*

- Predicting rice genes important for drought tolerance using gene regulatory networks and machine learning. **Crops InSilico, 4th Annual Symposium and Hackathon**, Urbana, IL, 3rd May 2019
- Arabidopsis seed-filling association-network analysis. **American Society of Plant Biologists – Southern Section (ASPB-SS)**, Lexington, KY, 30th March 2014.

### *Select posters*

- Network analysis of human brain cell types under Alzheimer's disease and healthy conditions, **Society of Neuroscience**, Chicago, IL, November 2021
- Network-based approach to prioritize lung cancer genes from whole-exome sequencing data. **AR-BIC**, Little Rock, AR, 25th March 2018
- Differential Co-expression: A new paradigm for identification of candidate genes from expression data. **AR-BIC**, Little Rock, AR, 24th April 2017
- An abiotic-stress conditioned gene regulatory network in rice predicted using an ensemble of reverse-engineering solutions. **The 25th Plant and Animal Genome (PAG) Conference**, San Diego, CA, 14th January 2017
- A resource for systems analysis of stress response in rice. **NSF Workshop on plant development and drought stress**, Monterey, CA, 8th November 2015
- StarchNet: Implications of high night-time temperature on starch metabolism regulatory networks in rice. **AR NSF EPSCoR Annual Meeting**, Fayetteville, AR, 15th September 2015
- In Silico Analysis of Fusion Proteins in Cancer, **International Conference on Biomedical and Genomic Research**, Ahmedabad, India, 30th January 2009

## AWARDS

1. Crops in silico underrepresented minority travel scholarship, **Crops InSilico**, Urbana, IL, 2019
2. Scherago International Student Travel Grants Awards, **The 25th annual Plant and Animal Genome (PAG) meeting**, San Diego, CA, 2017
3. NSF Travel Grant to attend the Workshop on Plant Development and Drought Stress, **National Science Foundation**, 2015
4. Stood 3rd in merit list for all India entrance examination for Master's in bioinformatics program, **Sardar Patel University**, India, 2007
5. 2nd Prize in undergraduate oral presentation, **Sardar Patel University**, India, 2006
6. 3rd Prize in undergraduate poster competition, **Atmiya University**, India , 2006

## GRANT CONTRIBUTIONS

- **NSF EPSCoR RII Track-2 FEC 1826836**: Systems genetics studies on rice genomes for analysis of grain yield and quality under heat stress (PI: Dr. Andy Pereira; \$4,659,406), 2018
- **NSF MCB 1716844**: Systems genetics analysis of photosynthetic carbon metabolism in rice (PI: Dr. Andy Pereira; \$798,725.00), 2017

## SOCIETY MEMBERSHIPS

2019 - present      **The International Society for Computational Biology (ISCB)**

## SELECT SKILLS

<i>Programming</i>	R, Python, Perl, PHP, MySQL
<i>Bioinformatics</i>	Raw sequence data (NGS) processing, quality control, and downstream analysis (single-cell, bulk); differential expression, variant calling, gene-set enrichment analysis, network analysis
<i>Data science</i>	Machine learning (data cleaning, feature extraction, model training and evaluation); Supervised and unsupervised learning.
<i>Visualization</i>	R, Shiny, Cytoscape
<i>Platforms</i>	Docker; Linux, MacOS; Google Cloud

## TOOLS DEVELOPED

<i>GRAiN</i>	<a href="http://rrn.uark.edu/shiny/apps/GRAiN/">http://rrn.uark.edu/shiny/apps/GRAiN/</a>
<i>SANe</i>	<a href="https://plantstress-pereira.uark.edu/SANe/">https://plantstress-pereira.uark.edu/SANe/</a>
<i>RECoN</i>	<a href="https://plantstress-pereira.uark.edu/RECoN/">https://plantstress-pereira.uark.edu/RECoN/</a>

## MENTORING EXPERIENCE

Mentored a graduate student (Masters in Statistics, UW) and four undergraduate students under the University of Madison's Undergraduate Research Scholar contract for two semesters, 2021-2022. Project title: "Using network-based machine Learning to predict genes underlying neurological disorders"

## TEACHING EXPERIENCE

Co-taught Plant Genomics (**Bioinformatics/Genomics modules**: CSES 5543, Uni. Of Arkansas), 2016, 2018

## EXTENSION ACTIVITIES

Student and Teacher Workshop: rice genetic variation (18 credit hours, Uni. Of Arkansas), 2019

## ACADEMIC SERVICE

- **Manuscript reviewer** for Human Molecular Genetics, Journal of Neurodevelopmental Disorders, Plant Physiology, Frontiers in Plant Science, Nature Scientific Reports, Rice, Plant Cell Reports, Horticultural Plant Journal, Plant Methods, PLoS One, iMETA.
- **Plante Fellow 2019**: Contribution to the Plantae online portal for Bioinformatics resources relevant to plant biology research
- **Member of the panel of judges** for the Northwest Arkansas Regional Science and Engineering Fair 2015,16
- Conducted several training material and hands-on activities for undergraduates and K-12 students from the Arkansas agricultural areas in the Delta region for a **STEM literacy outreach program**

## REFREES

Available upon request